

# **NAVAL POSTGRADUATE SCHOOL**

## **Monterey, California**



## **THESIS**

**THE UTILITY OF THE MYERS-BRIGGS TYPE  
INDICATOR AND THE STRONG INTEREST INVENTORY  
IN PREDICTING SERVICE COMMUNITY SELECTION  
AT THE UNITED STATES NAVAL ACADEMY**

by

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June 2002

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**REPORT DOCUMENTATION PAGE**
*Form Approved OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

<b>1. AGENCY USE ONLY (Leave blank)</b>	<b>2. REPORT DATE</b> June 2002	<b>3. REPORT TYPE AND DATES COVERED</b> Master's Thesis
<b>4. TITLE AND SUBTITLE:</b> The Utility of the Myers-Briggs Type Indicator and the Strong Interest Inventory in Predicting Service Community Selection at the United States Naval Academy.		<b>5. FUNDING NUMBERS</b>
<b>6. AUTHOR(S)</b> Bowers, Kendra M.		
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000		<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>
<b>9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A		<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.		
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited.		<b>12b. DISTRIBUTION CODE</b>

**13. ABSTRACT (maximum 200 words)**

This study provides information for those individuals responsible for guiding midshipmen's choice of naval service community. This research is focused on individuals who received their first community choice. Myers-Briggs Type Indicator results and career and technical interest measures based on the Strong Interest Inventory from the Naval Academy classes of 1998-2001 were analyzed using discriminant analysis.

This project was designed to provide company officers with the information needed to counsel midshipmen about the service communities available following graduation from the United States Naval Academy. The analysis demonstrates that while personality type, as measured by the Myers-Briggs, does affect the likelihood that an individual will select a particular community, other demographic information such as academic major, SAT scores, and Order of Merit have a much greater effect. The Career and Technical interest measures used by the Naval Academy's Admissions Board were found to have very little effect on community selection.

<b>14. SUBJECT TERMS</b> Personality and Vocational Interests, Psychological Type, Myers-Briggs Type Indicator, Strong Interest Inventory, Naval Service Community, Community Selection		<b>15. NUMBER OF PAGES</b> 79
<b>16. PRICE CODE</b>		
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified
		<b>20. LIMITATION OF ABSTRACT</b> UL

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**THE UTILITY OF THE MYERS-BRIGGS TYPE INDICATOR AND THE  
STRONG INTEREST INVENTORY IN PREDICTING SERVICE COMMUNITY  
SELECTION AT THE UNITED STATES NAVAL ACADEMY**

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Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF SCIENCE  
IN  
LEADERSHIP AND HUMAN RESOURCE DEVELOPMENT**

from the

**NAVAL POSTGRADUATE SCHOOL  
June 2002**

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This study provides information for those individuals responsible for guiding midshipmen's choice of naval service community. This research is focused on individuals who received their first community choice. Myers-Briggs Type Indicator results and career and technical interest measures based on the Strong Interest Inventory from the Naval Academy classes of 1998-2001 were analyzed. Discriminant analysis was used to identify variables that most strongly predicted differences in community choice.

This project was designed to provide company officers with the information needed to counsel midshipmen about the service communities available following graduation from the United States Naval Academy. The analysis demonstrates that while personality type, as measured by the Myers-Briggs, does affect the likelihood that an individual will select a particular community, other demographic information such as academic major, SAT scores, and Order of Merit have a much greater effect. The Career and Technical interest measures used by the Naval Academy's Admissions Board were found to have very little effect on community selection.

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## TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	BACKGROUND .....	1
B.	PURPOSE.....	1
C.	SCOPE AND METHODOLOGY .....	1
D.	ORGANIZATION .....	2
II.	LITERATURE REVIEW .....	3
A.	SERVICE COMMUNITY ASSIGNMENT AT USNA .....	3
1.	Service Selection Process (Prior to 1995) .....	3
a)	<i>Academic Order of Merit</i> .....	3
b)	<i>Military Order of Merit</i> .....	3
c)	<i>Overall Order of Merit</i> .....	3
2.	Service Assignment Process (1995 to Present) .....	4
a)	<i>Interview Phase</i> .....	4
b)	<i>Community Screening Phase</i> .....	4
c)	<i>Preference</i> .....	5
d)	<i>Assignment Phase</i> .....	5
3.	Warfare Communities.....	6
a)	<i>Aviation</i> .....	6
b)	<i>Surface</i> .....	6
c)	<i>Submarine</i> .....	6
d)	<i>Marine Corps</i> .....	7
e)	<i>Special Operations</i> .....	7
f)	<i>Other Assignments</i> .....	7
B.	PERSONALITY TESTS .....	8
1.	Myers -Briggs Type Indicator (MBTI) .....	9
2.	Temperament .....	15
3.	Overview of Other Major Tests.....	16
C.	CAREER INTEREST TESTS .....	18
1.	Strong Interest Inventory (SII) .....	19
2.	The United States Naval Academy's SII scores .....	22
3.	Other Career Interest Inventories.....	24
III.	DATA SET AND METHODOLOGY .....	27
A.	DATA SET DESCRIPTION .....	27
B.	METHODOLOGY .....	29
C.	VARIABLES .....	30
IV.	DATA ANALYSIS .....	35
A.	INTRODUCTION.....	35
B.	ANALYSIS RESULTS .....	35
1.	Analysis of Both Genders Using MBTI results as a Variable .....	38
2.	Analysis of Males Using MBTI Results as a Variable .....	40

3. Analysis of Females Using MBTI Results as a Variable .....	41
4. Analysis of Both Genders Using Temperament and E/I Results as Variables .....	44
5. Analysis of Males Using Temperament and E/I Results as Variables .....	45
6. Analysis of Females Using Temperament and E/I Results as Variables .....	47
<b>V. CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>49</b>
A. INTRODUCTION.....	49
B. RESULTS .....	49
1. Combined Gender Analysis Using MBTI Results As Predictors ..	49
2. Male Midshipmen Analysis Using MBTI Results as Predictors .....	49
3. Female Midshipmen Analysis Using MBTI Results as Predictors .....	50
4. Combined Gender Analysis Using Temperament and E/I Results As Predictors .....	50
5. Male Midshipmen Analysis Using Temperament and E/I Results as Predictors .....	50
6. Female Midshipmen Analysis Using Temperament and E/I Results as Predictors .....	51
C. CONCLUSIONS .....	51
D. RECOMMENDATIONS.....	52
1. Policy .....	52
2. Further Research .....	52
<b>APPENDIX A .....</b>	<b>55</b>
<b>LIST OF REFERENCES .....</b>	<b>57</b>
<b>INITIAL DISTRIBUTION LIST .....</b>	<b>63</b>

## **LIST OF FIGURES**

<b>Figure 1.</b>	<b>Distribution of Service Assignments .....</b>	<b>28</b>
<b>Figure 2.</b>	<b>MBTI Results For Each Major Service Assignment Community .....</b>	<b>37</b>

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## LIST OF TABLES

<b>Table 1.</b>	<b>MBTI Type Table and Descriptions .....</b>	<b>11</b>
<b>Table 2.</b>	<b>Effects of Preferences in Work Situations .....</b>	<b>13</b>
<b>Table 3.</b>	<b>General Occupational Themes Descriptions and Sample Jobs .....</b>	<b>20</b>
<b>Table 4.</b>	<b>Basic Interest Scales and Related General Occupation Themes .....</b>	<b>20</b>
<b>Table 5.</b>	<b>Personal Style Scales and Sample Jobs .....</b>	<b>21</b>
<b>Table 6.</b>	<b>Service Assignment Options .....</b>	<b>28</b>
<b>Table 7.</b>	<b>Predictor Variable Description.....</b>	<b>33</b>
<b>Table 8.</b>	<b>Service Assignment by Gender .....</b>	<b>35</b>
<b>Table 9.</b>	<b>Service Assignment by Ethnicity .....</b>	<b>35</b>
<b>Table 10.</b>	<b>MBTI Results by Gender and Minority.....</b>	<b>36</b>
<b>Table 11.</b>	<b>Temperament Results by Gender and Minority .....</b>	<b>37</b>
<b>Table 12.</b>	<b>Summary Statistics for Discriminant Analysis of Service Assignment – Both Genders With MBTI Results Used As Variables.....</b>	<b>38</b>
<b>Table 13.</b>	<b>Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Both Genders With MBTI Results Used As Variables .....</b>	<b>39</b>
<b>Table 14.</b>	<b>Summary Statistics for Discriminant Analysis of Service Assignment – Males Only With MBTI Results Used As Variables.....</b>	<b>40</b>
<b>Table 15.</b>	<b>Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Males Only With MBTI Results Used As Variables .....</b>	<b>41</b>
<b>Table 16.</b>	<b>Summary Statistics for Discriminant Analysis of Service Assignment – Females Only With MBTI Results Used As Variables.....</b>	<b>42</b>
<b>Table 17.</b>	<b>Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Females Only With MBTI Results Used As Variables .....</b>	<b>43</b>
<b>Table 18.</b>	<b>Summary Statistics for Discriminant Analysis of Service Assignment – Both Genders With Temperament and E/I Results Used As Variables .....</b>	<b>44</b>
<b>Table 19.</b>	<b>Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Both Genders With Temperament and E/I Results Used As Variables.....</b>	<b>45</b>
<b>Table 20.</b>	<b>Summary Statistics for Discriminant Analysis of Service Assignment – Males Only With Temperament and E/I Results Used As Variables .....</b>	<b>46</b>
<b>Table 21.</b>	<b>Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Males Only With Temperament and E/I Results Used As Variables.....</b>	<b>46</b>
<b>Table 22.</b>	<b>Summary Statistics for Discriminant Analysis of Service Assignment – Females Only With Temperament and E/I Results Used As Variables.....</b>	<b>47</b>
<b>Table 23.</b>	<b>Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Females Only With Temperament and E/I Results Used As Variables.....</b>	<b>48</b>

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## **ACKNOWLEDGMENTS**

I would like to thank the individuals who contributed so much time and effort to this thesis. First, I would like to thank Professor Janice Laurence and Professor Kenneth Thomas for their insight and patience. Their assistance was greatly appreciated. Finally, I would like to thank my husband Jefferson, for his encouragement, patience, and love.

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## **I. INTRODUCTION**

### **A. BACKGROUND**

Every January at the United States Naval Academy, approximately 1000 seniors experience a process known as Service Assignment. This assignment is the culmination of their nearly four years of college education and is a decision that will affect them for as little as five years (minimum required military obligation after graduation) or as long as 30 years for those that make the military a career. While considerable literature examining the relationship between personality type and occupation indicates that certain personality types migrate to particular occupations, little attention has been given to military personnel. This paper will analyze the relationship between personality types of midshipmen and their service community selection.

### **B. PURPOSE**

To determine if there is a relationship between the Myers-Briggs Type Indicator and/or the Strong Interest Inventory and service community selection so that this information can be used to help counsel midshipmen on their service community choices.

### **C. SCOPE AND METHODOLOGY**

This study examined the relationship between personality and career interest measures and choice of occupation in the Navy and Marine Corps. Only the primary warfare communities were considered: Surface Warfare (nuclear and conventional); Submarine Warfare; Aviation (pilot and naval flight officer); and Marine Corps (Aviation and Ground Forces). The remaining communities were not evaluated at length due to the limited number of students who select these occupations.

The scope includes: (1) a review of the Myers-Briggs Type Indicator and Strong Interest Inventory, (2) a review of the service assignment process at the United States Naval Academy, (3) an in-depth analysis of MBTI & SII results as they relate to service assignment, and (4) an in-depth analysis of these results as they relate to female service assignment at the Academy. This thesis is intended to determine if personality and career

indicators indicate anything about the service community that graduating midshipmen select.

The design used an archival review of pre-existing data sets from the classes of 1998-2001. These data sets contain information on actual service assignments as well as a variety of descriptive information on each midshipman. Service assignment occurs when a midshipmen is assigned to his or her future warfare community (occupation). The process of service assignment is described in Chapter II.

#### **D. ORGANIZATION**

This study is divided into five chapters and an appendix. Chapter I is an overview of the study. A review of pertinent literature related to occupational choice, the Myers-Briggs Type Indicator, the Strong Interest Inventory, and the United States Naval Academy is presented in Chapter II. Chapter III provides a description of the variables examined in this study as well as methodology. Chapter IV reviews the findings of each analysis performed, and Chapter V provides conclusions as well as recommendations for further research. Appendix A includes the results of various discriminant analyses that were performed but not specifically analyzed in the course of this study.

## II. LITERATURE REVIEW

### A. SERVICE COMMUNITY ASSIGNMENT AT USNA

The service assignment process at the United States Naval Academy (USNA) is designed to meet the needs of the Navy and Marine Corps by placing the best-qualified midshipmen in each available billet. Selections are based on the needs of the Navy and the Marine Corps, midshipmen preferences, and the qualifications of the midshipmen (United States Naval Academy, 2000).

#### 1. Service Selection Process (Prior to 1995)

Prior to 1995, community selection was based solely on the graduating midshipman's Overall Order of Merit (OOOM) – a combination of the Academic and Military Orders of Merit (United States Naval Academy, 1996).

##### a) *Academic Order of Merit*

Academic Order of Merit (AOOM) is based on a cumulative quality point rating (CQPR) system (United States Naval Academy, 1997). The CQPR is equivalent to the grade point average system found at most universities and is based on academic (non-professional) courses. A minimum of a 2.0 CQPR is required for a midshipman to graduate (United States Naval Academy, 1996).

##### b) *Military Order of Merit*

Military Order of Merit (MOOM) is based on the cumulative professional/military quality point rating (MQPR). The MQPR is divided into the following areas: physical education, athletic performance, military performance, military conduct, and grades received from professional development courses (United States Naval Academy, 1996).

##### c) *Overall Order of Merit*

Overall Order of Merit consists of the AOOM and the MOOM for each person. The AOOM is approximately 65% of the OOOM and the MOOM is approximately 35% (United States Naval Academy, 1996).

All graduates who are physically qualified are commissioned in the Unrestricted Line (URL) of the United States Navy or Marine Corps. Graduates who are not physically qualified are commissioned in the Restricted Line (RL) or Staff Corps of the Navy. Prior to the repeal of the Combat Exclusion Law in 1993 (Section 6015, Title 10, U.S. Code), all female graduates who were physically qualified were commissioned in the Restricted Line or Staff Corps of the USN (Chief of Naval Operations, 1990). Starting with the graduating class of 1994, all physically qualified graduates, regardless of gender, are commissioned in the URL (Chief of Naval Operations, 1994).

## **2. Service Assignment Process (1995 to Present)**

In 1995, the Service Assignment process was instituted. The factors weighed by the Service Assignment Board include personal preference, OOOM, and a personal interview with a board of two to three officers. After reviewing each of these factors, and data supplied by the Bureau of Naval Personnel, Initial Assignments Branch, midshipmen are assigned communities. Historically, approximately 90 to 95 percent of midshipmen are assigned to their first choice of service community.

### **a) *Interview Phase***

The purpose of the interview phase is to provide objective information to the assignment boards regarding each midshipman's qualification for commissioning. A team of two to three officers interviews each midshipman with the senior member of the board being from the midshipman's first preference of community. The interview team grades each midshipman in five areas – appearance and poise, oral communication, leadership potential, community motivation, and community understanding. The senior member also provides written comments regarding each midshipman's performance at the board. The intent is to provide useful information to the community assignment board for use when they must decide to recommend one midshipman over another (United States Naval Academy, 2000).

### **b) *Community Screening Phase***

Community screening consists of medical and community specific academic, physical, and professional screening. These include the Aviation Selection Test Battery (ASTB) for those desiring aviation or an interview with the Director, Naval

Reactors for those desiring any nuclear program. Other communities requiring additional screening include: Special Warfare, Special Operations, Civil Engineering Corps, and Oceanography Option programs. Community screening is a pass/fail event to determine those midshipmen who meet the minimum community requirements. In the case of nuclear programs, those midshipmen who are accepted by the Director, Naval Reactors are obligated to assignment as a nuclear officer (United States Naval Academy, 2000).

*c) Preference*

During the beginning of the final semester, each graduating midshipman submits a preference sheet indicating the occupation he or she desires from among those communities for which he or she has been found fully qualified. This sheet allows an individual to list up to six career fields or warfare communities in order of preference (United States Naval Academy, 2000).

*d) Assignment Phase*

During the assignment phase, service assignment boards for each community will select the best qualified midshipmen from among those applying up to the ceilings provided by the Bureau of Naval Personnel (BUPERS) and Headquarters Marine Corps (HQMC). The Service Assignment Board normally consists of three to five officers from the particular community, with the senior member of the board being the senior member of the community assigned to the Naval Academy. The board is provided a list of all qualified midshipmen who have indicated that community as their first choice. Based on the guidance provided in the precepts and the information available in each midshipman's records (including the results of the interview), the board will select midshipmen for the community up to the established ceiling. Midshipmen who are not selected for their first choice community will then be considered by their second choice community. This process continues until all midshipmen have been assigned to a community. An Executive Review Board reviews the recommendations of the service assignment boards and then forwards them to the Superintendent for final approval (United States Naval Academy, 2000).

### **3. Warfare Communities**

All Naval warfare communities are represented in the Service Assignment process, the top four being Aviation, Surface, Submarine, and Marine Corps. Other assignments include Medical Corps, Supply Corps, and General Unrestricted Line. Starting with the class of 2002, the active duty service obligation for USNA graduates is five years except for the following (United States Naval Academy, 2001):

Navy Air: Pilot: 8 years after earning wings

NFO: 6 years after earning wings

USMC Air: Pilot: 8 years after earning wings (jet)

6 years after earning wings (prop/helo)

NFO: 6 years after earning wings

#### **a) Aviation**

The Aviation community includes naval aviators (pilots) and naval flight officers (NFOs). The initial training for both is conducted at Aviation Preflight Indoctrination (API) in Pensacola, FL. The pilot training pipeline is approximately 18-24 months, depending on type of aircraft. NFO training is approximately 12-18 months, again depending on type of aircraft (United States Naval Academy, 2000).

#### **b) Surface**

Surface Warfare Officers (SWOs) attend Surface Warfare Officers School (SWOS) in Newport, RI for six months and then serve in every type of surface ship. The first tour of duty is approximately 24 months. Following the first tour, conventional and nuclear power designated SWOs separate. Nuclear SWOs attend a one-year long training course at nuclear power school before reporting to their next ship (United States Naval Academy, 2000).

#### **c) Submarine**

The training pipeline for submarine officers begins with Nuclear Power School and prototype training. Upon completion of this training, the officers attend Submarine Officer Basic Course in New London, CT. Following training, officers are assigned to their first submarines for a 36-month tour. During this time, they will earn

their “dolphins,” signifying that they have obtained their ships qualifications and are now trusted members of the crew (United States Naval Academy, 2000).

*d) Marine Corps*

Following graduation, all Marine officers attend The Basic School (TBS) in Quantico, VA. This school gives all Marine officers a common background in the tactical study of land warfare. The Marine Corps assignment is unique in that only aviation candidates are designated at USNA’s Service Assignment. Every other operational specialty is assigned after the completion of TBS. Advanced training in a particular occupational specialty is based on specific qualifications and preferences.

Marine Corps career fields are included in two basic categories - ground and air. Ground choices include infantry, armor, artillery, logistics, engineering, communications-information systems, financial management, and military police. Aviation choices include pilot, naval flight officer (NFO), air command and control, anti-air warfare, aviation maintenance, and aviation supply (United States Naval Academy, 2000).

*e) Special Operations*

Special Operations is the Navy’s newest warfare community and has four functional areas: Explosive Ordnance Disposal (EOD), Mine Countermeasures (MCM), Operational Diving and Salvage (ODS), and Explosive Ordnance Management (EOM).

Special Warfare provides qualified officers the opportunity to be a member of the one of the world’s elite fighting forces – specifically, the U.S. Navy Sea, Air and Land (SEAL) team (United States Naval Academy, 2000).

*f) Other Assignments*

Other community assignments include a variety of Restricted Line and Staff Corps fields. These include intelligence, cryptology, oceanography, medicine, civil engineering, supply, and aviation maintenance.

Despite the Combat Exclusion Law repeal of 1993, women are not currently assigned to train and serve as SEALS or submarine officers in the Navy or as infantry, artillery or armor officers in the Marine Corps.

A 1998 thesis investigated the relationship between academic major at the Naval Academy and service community selection (Arcement, 1998). Results indicated that midshipmen who change their academic major from engineering to either one of the science majors or non-engineering majors decrease the likelihood of obtaining their original service community selection.

The present study expands the search of predictors of community assignment by examining non-cognitive personality and interest measures currently in use at the Naval Academy. Specifically, Myers-Briggs Type Indicator measures and Strong Interest Inventory measures were examined. The following sections will describe these measures in more detail.

## **B. PERSONALITY TESTS**

Personality is among the characteristics assessed upon entry into the Naval Academy. The Myers-Briggs Type Indicator (MBTI) is administered to every midshipman during his or her freshman year. Based on the MBTI, the personality types of midshipmen have been related to such things as leadership characteristics, voluntary attrition, and performance assessment (Roush, 1989; 1992; 1997). Currently, the MBTI is used during freshman leadership classes to help teach midshipmen about personality differences. MBTI results are also offered to both coaches and company officers in order to help them interact with the many midshipmen they deal with on a daily basis (Argetsinger, 1999).

Personality typing is not used or studied very much within the clinical psychological and psychiatric communities, nor is it universally accepted. Because personality typing does not measure mental health, and assumes that all preferences and types are equally normal and healthy, many therapists who are treating mental illness do not find it useful. However, some do use this system for their patients and clients in order to help them “find themselves” and for other non-mental health related purposes such as marriage and career counseling (Noring, 1993).

## **1. Myers-Briggs Type Indicator (MBTI)**

Carl Jung first developed personality typing in the 1920s. In its purest form, Jungian personality typing is extremely complex, and even today it is difficult to understand Jung's writings on personality (Noring, 1993). In the 1950s, Myers and Briggs resurrected Jung's theories, modified them somewhat, and developed a psychometric called the Myers-Briggs Type Indicator (MBTI). MBTI results indicate a respondent's likely preferences on four dimensions: Extraversion (E) or Introversion (I); Sensing (S) or Intuition (N); Thinking (T) or Feeling (F); and Judging (J) or Perceiving (P).

Differences in orientation and direction of energy fall along a scale of extraversion (E) and introversion (I) according to Jung. Extraverts are drawn toward people and things outside themselves and tend to actively pursue external interaction drawing mental and emotional energy from these exchanges. Introverts tend to direct their energy and attention toward reflection and draw energy from quiet, introspective time (Kirby, 1997).

Jung identified two ways of gathering information, modes that he named Sensing (S) and Intuition (N). Each individual will have a natural preference for one of these two opposites. Sensors prefer to gather information through what is actually in the present, or on data available to the senses. Those who prefer to gather information through intuition are drawn to the overall patterns and meanings that will put specific data into context (Kirby, 1997).

Jung named the two different ways that people organize and structure information and make decisions as Thinking (T) and Feeling (F). Thinkers like to apply logical principles to make objective decisions, while those who prefer Feeling like to make decisions by a process of valuing – they filter situations through their own values, the values of people important to them and the values of the organization to which they are committed (Kirby, 1997).

Myers and Briggs added the final set of opposites to Jung's original work when they developed the MBTI. This final set refers to how people like to organize their external environment and is described as either Judging (J) or Perceiving (P). Those

people that direct their Thinking/Feeling attribute toward the external world are described as Judging. They prefer their environment to be orderly, clear, planned, and scheduled. Those individuals that direct their Sensing/Intuition attribute toward the external world are described as Perceiving. They prefer to keep their environment as open and unstructured as possible (Kirby, 1997).

The four sets of opposites described above result in 16 possible four-letter combinations, thus the MBTI describes 16 personality types. The number that accompanies the letter result is an indication of how clearly each preference was reported (Kirby, 1997). Table 1 shows the MBTI types with a brief description.

Table 1. MBTI Type Table and Descriptions

ISTJ	Quiet, serious, practical, realistic, responsible, orderly, values traditions and loyalty, decides logically what should be done and works steadily
ISFJ	Quiet, friendly, responsible, conscientious, thorough, concerned with how other people feel
INFJ	Seeks meaning and connection in ideas and relationships, insightful about others, committed to firm values, organized and decisive
INTJ	Great drive for implementing ideas, quickly sees patterns, skeptical and independent, high standards of competence and performance
ISTP	Tolerant and flexible, acts quickly to find solutions, analyzes what makes things work, interested in cause and effect, values efficiency
ISFP	Quiet, friendly, sensitive, kind, like to have their own space, dislike disagreements, don't force their opinions on others
INFP	Idealistic, loyal to values, want an external life congruent with their values, curious, seek to understand people, adaptable, flexible, and accepting
INTP	Seek to develop logical explanations for everything that interests them, theoretical, abstract, more interested in ideas than social interaction, adaptable, focus in depth on problems, analytical
ESTP	Flexible, tolerant, acts energetically to solve problems, spontaneous, enjoys material comforts, learns best through doing
ESFP	Outgoing, friendly, accepting, enjoy working with others, brings common sense to their work, flexible, spontaneous, learn best by trying a new skill with others
ENFP	Enthusiastic, imaginative, makes connections between events and information quickly, seeks affirmation from others, readily gives appreciation and support
ENTP	Quick, ingenious, stimulating, alert, outspoken, resourceful in solving new problems, good at reading other people, bored by routine
ESTJ	Practical, realistic, matter-of-fact, decisive, focuses on getting results efficiently, clear set of logical standards, forceful in implementing their plans
ESFJ	Warmhearted, conscientious, cooperative, seek harmony in their environment, enjoys working with others, loyal, want to be appreciated
ENFJ	Warm, empathetic, responsive, responsible, highly attuned to emotions of others, finds potential in everyone, acts as catalyst for individual and group growth, sociable, provide inspiring leadership
ENTJ	Frank, decisive, assume leadership readily, quickly sees illogical procedures, enjoys long-term planning, well-informed, forceful in presenting their ideas

Derived from *Introduction to Type* (6<sup>th</sup> ed., p. 13), by I.B. Myers, with L.K. Kirby & K.D. Myers, 1998, Palo Alto, CA: Consulting Psychologists Press.

The theory of type development states that everyone has the capability of leaning towards either end of the four dimensions, however people differ with regard to their “polar” preferences (Lynch, 1987).

After more than 50 years of research and development, the MBTI is one of the most widely used instruments for understanding normal personality differences. It is used in such things as career exploration, development and counseling; organizational development; team building; management training; curriculum development and leadership development. More than three million MBTIs are administered each year in the United States and the instrument has been translated into more than two-dozen languages (“What is the MBTI?” 2001).

The basic hypothesis underlying the use of the MBTI for suggesting careers is that a good fit between the characteristics of the person and those of the work environment will result in higher satisfaction, productivity, creativity, and personal and vocational stability (Hammer, 1996). Myers and McCaulley (1985) outline work situations for each preference scale. These effects are summarized in Table 2.

Table 2. Effects of Preferences in Work Situations

<b>Extraversion</b>	<b>Introversion</b>
Like variety and action. Dislike complicated procedures. Often good at greeting people. Impatient with long, slow jobs. Interested in results of their job. Do not mind interruption. Often act quickly. Like to have people around. Usually communicate freely.	Like quiet concentration. Tend to be careful with details. Have trouble remembering names and faces. Don't mind working on long projects. Interested in the idea behind their job. Dislike interruptions. Like to think before they act. Work contently alone. Have problems communicating.
<b>Sensing</b>	<b>Intuition</b>
Dislike new problems. Like established order of things. Enjoy using skills already learned. Work steadily. Patient with routine details. Impatient with complicated details. Often not inspired. Seldom make errors of fact. Tend to be good at precise work.	Like solving new problems. Dislike doing the same thing repeatedly. Enjoy learning a new skill more than using it. Work in short bursts of energy. Impatient with routine details. Patient with complicated situations. Follow their inspirations. Frequently make errors of fact. Dislike taking time for precision.
<b>Thinking</b>	<b>Feeling</b>
May be uncomfortable dealing with people's feelings. May hurt people's feelings without knowing it. Like analysis and putting things into order. Tend to decide impersonally. May pay insufficient attention to people's wishes. Need to be treated fairly. Able to reprimand or fire people. Analytically oriented. Tend to be firm-minded.	Tend to be very aware of other people and their feelings. Enjoy pleasing people, even in unimportant things. Like harmony. Let decisions be influenced by personal likes and dislikes. Need occasional praise. Dislike telling people bad news. People-oriented. Tend to be sympathetic.
<b>Judgment</b>	<b>Perception</b>
Work best when they can plan their work. Like to get things settled and finished. May decide things too quickly. May dislike interrupting the project they are on for a more urgent one. May not notice new things to be done. Need only the essentials to begin their job. Tend to be satisfied once they reach a judgment on a thing, situation, or person.	Adapt well to changing situations. Like to leave things open for change. May have trouble making decisions. May start too many projects and have difficulty finishing them. May postpone unpleasant jobs. Want to know all about a new job. Tend to be curious and welcome a new light on a thing, situation, or person.

Derived from *MBTI Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator*, (p.79) by I.B. Myers and M. H. McCaulley, 1985, Palo Alto, CA: Consulting Psychologists Press.

The MBTI research literature is filled with studies showing the distribution of types in various occupations. Data showing this distribution in over 200 occupations is found primarily in *The Atlas of Type Tables* (Macdaid, McCaulley, & Kaintz, 1986), the *MBTI Manual* (Myers et al, 1998), and the *MBTI Career Report Manual* (Hammer & Macdaid, 1992). A cursory review of these data shows that the 16 types are not distributed evenly across occupations but, rather, are generally consistent with theoretical predictions. In general, the more the occupation requires certain knowledge or skills, the less equally distributed the types will be across that occupation (Hammer, 1996).

For example, Descouzis (1989) studied a sample of tax preparers. She describes this occupation as one that requires exacting and scrupulous attention to detail in combination with a vast amount of detailed knowledge. Type theory would predict that ISTJs and ISFJs would predominate in this field, and indeed Descouzis found that 100% of the sample exhibited a preference for Sensing and 44% were ISTJs or ISFJs (Hammer, 1996). Similarly, in a study of pilots and industrial workers in Norway, 88% of the pilots and 96% of the industrial workers were found to be STJs (Nordvik, 1994).

The *MBTI Manual* (Myers and McCaulley, 1985) includes extensive information on split-half and test-retest reliabilities and reports reliability coefficients consistently at 0.80, indicating excellent reliability. There is evidence in support of the proposition that occupational choice is related to the preferences measured by the MBTI. However, whereas the evidence for concurrent validity is strong, there is lack of evidence regarding predictive validity (Hammer, 1996).

Roush and Atwater (1992) reported that students at the Naval Academy predominantly display the personality type “Extraverted, Sensing, Thinking, and Judging” (ESTJ). This personality type is described as “assertive, practical, rational, loyal, opinionated and decisive” (Shehan, 1997).

Researchers using other personality measures have validated these findings. Using the Hogan personality inventory, the typical midshipman at the Naval Academy was described as “approachable, outgoing, and flexible, who enjoys change and finding new ways to solve problems and who doesn’t mind confronting conflict” (Johnson et al, 1999, p.7). This is consistent with the description of an ESTJ personality.

This homogeneity among midshipmen is not surprising in light of self-selection and the effects of the admissions process. Students of a few similar personality types are more likely to find the Naval Academy appealing and the Admissions Board's strict standards and screening criteria ensure that only those students who are likely to succeed are offered admission. Roush's (1997) examination of voluntary attrition from the Naval Academy for the classes of 1991 and 1992 also led to consistent findings. The personality characteristics of midshipmen who voluntarily dropped out during the first semester of their freshman year deviated from the prototypical ESTJ.

Murray (2001) used the MBTI to study attrition of female Naval Academy midshipmen and found that it was not a good predictor of either academic or military success in terms of grades and class standing. However, there is evidence that the ESTJ type is more prevalent among graduates and the ISFP and ENFP types are more prevalent among dropouts.

A 1993 Coast Guard Academy study indicated significant correlations among personality preferences, academic success, and military performance. Specifically Introversion (I), Intuition (N), and Judgment (J) were significantly associated with successful academic and military performance (O'Conner, 1993).

## **2. Temperament**

The dimensions of Sensing-Intuition and Thinking-Feeling were considered by Myers to be the most relevant for pointing a person toward a general occupational area or field. The dimensions of Extraversion-Introversion and Judging-Perceiving were thought to be most useful in helping the person choose a specific working environment within a given field (Hammer, 1996). Keirsey (1998) calls these occupational traits temperaments. Keirsey goes on to describe four different temperaments that are derived from the MBTI scales – SP, NF, SJ, and NT.

Tieger and Barron-Tieger (1995) use the four Keirsey temperaments to help individuals find a job that is personally satisfying. SJs (Sensing Judgers) are the most traditional of the four temperaments. They value law and order, security, propriety, rules and conformity. A good job for an SJ might be one that involves a relatively high level of responsibility and has a clear-cut chain of command. They prefer working in an

environment where both regulations and rewards are certain. The role they most often play is that of stabilizer – the maintainer of traditions and the status quo (Tieger & Barron-Tieger, 1995).

SPs (Sensing Perceivers) are the most adventurous of the four temperaments as they live for action and impulsiveness. SPs value freedom and spontaneity and are risk-taking and pragmatic. A good job for an SP might be one that provides autonomy, variety, and action. They are often involved in occupations that allow them to use acquired skills (Tieger & Barron-Tieger, 1995).

NFs (Intuitive Feelers) are the most spiritually philosophical of the temperaments. They place a very high value on authenticity and integrity and tend to idealize others. NFs are often gifted at helping others grow and develop and are excellent communicators. A good job for an NF is one that is personally meaningful, rather than routine or expedient. They are often found in human resources or personnel positions, as well as in teaching, consulting, and counseling (Tieger & Barron-Tieger, 1995).

The final temperament, NTs (Intuitive Thinkers), is the most independent. They are driven to acquire knowledge and set very high standards for themselves and others. They enjoy being challenged and can be fiercely competitive. A good job for an NT would be one that provides autonomy, variety, and the opportunity to generate ideas. They are often found in leadership positions, such as college-level teaching, upper management, medicine and law (Tieger & Barron-Tieger, 1995).

A 1996 study of MBTI distribution across the United States showed that the SJ temperament is likely the most dominant temperament among Americans (Hammer & Mitchell, 1996).

### **3. Overview of Other Major Tests**

The Cattell 16PF (16 personality factor) model is one of the most widely used systems for categorizing and defining personality. Unlike the MBTI, the 16PF defines an individual's basic, underlying personality without regard to how it is applied or to the environment in which it is applied (Matthews & Deary, 1998). The 16 personality factors measured by the 16PF are: Warmth, Reasoning, Emotional Stability, Dominance, Liveliness, Rule Consciousness, Social Boldness, Sensitivity, Vigilance, Abstractedness,

Privateness, Apprehension, Openness to Change, Self-Reliance, Perfectionism, and Tension.

Barton, Dielman, and Cattell (1971) found significant correlations between several 16PF scales and achievement in various school subjects. Similar research (Cattell & Butcher, 1968) shows that personality predicts achievement even when intelligence is statistically controlled. The 16PF5 takes the 16 factors of the 16PF and groups them together into 5 overall themes – extraversion, anxiety, will, independence, and self-control.

The California Psychological Inventory (CPI) assesses 18 traits with moderately good reliability and is widely used in industry (Matthews & Deary, 1998). It includes 20 scales that measure a broad array of individual difference variables: interactional, socially observable qualities (e.g., dominance and independence), internal values and controls, achievement-seeking needs, and stylistic modes (e.g., flexibility and masculinity/femininity). There are also 13 scales designed for special purpose (e.g., managerial potential, creative temperament). Three broad vector scales can be scored from the entire inventory: internality/externality, norm favoring/norm questioning, and self-fulfilled/dispirited (Gough & Bradley, 1996).

The Multidimensional Personality Questionnaire (MPQ) measures three higher order factors of personality – Positive Emotionality (PE), Negative Emotionality (NE), and Constraint (CT). These higher order factors correlate minimally and include 11 personality dimensions called primary scales. The PE factor includes Well-being, Social Potency, Achievement, and Social Closeness. The NE factor includes Stress Reaction, Alienation, and Aggression. The CT factor includes Control, Harm Avoidance, and Traditionalism. The factor of Absorption is included in both PE and NE. Two studies (Blake & Sackett, 1999; Lykken & Tellegen, 1995) examine this model and vocational interests (Larson & Borgen, 2002).

Currently the most popular approach among psychologists for studying personality traits is the five-factor model or “Big Five” dimensions of personality. However, it would be more appropriate to speak of the big fives, since there is no single set of identical dimensions agreed upon by all researchers. Costa and McCrae base their

model on the widely used NEO-Personality Inventory-Revised (NEO-PI-R). The NEO-PI-R is made up of 240 questions, 48 for each of the five domains. The five broad domains are called Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness (Matthews & Deary, 1998). These five domains are often abbreviated to “OCEAN.”

The five factors have been found to be stable over a 45-year period beginning in young adulthood (Soldz & Vaillant, 1999). Early meta-analytic work by Barrick and Mount (1991) and Tett et al. (1991) provided evidence suggesting that the Big Five might have some degree of utility for selecting employees into a variety of jobs. Behling (1998) claimed that Conscientiousness was one of the most valid predictors of performance for most jobs. Hurtz and Donovan (2000) conclude that the estimated true validity of the Conscientiousness dimension is 0.20, but do concede that global measures of Conscientiousness can be expected to consistently add a small portion of explained variance in job performance across jobs and across criterion dimensions.

### **C. CAREER INTEREST TESTS**

In addition to the MBTI, USNA has employed other non-cognitive measures. In 1967, USNA began using a career interest test known as the Strong Vocational Interest Blank (SVIB) to help it predict attrition during the first year. In recent years, career interest measures have been used as part of the admissions process to predict technical interest and career retention. The following section describes the Strong Interest Inventory (as it is now known) and other career interest measures.

Many influential vocational interest theories emerged in the 1950s and 1960s including those of Ginsburg, Axelrod, Roe, and Holland. Some theorists (e.g. Roe, Ginsburg) emphasized the role of parental identification as a critical aspect of occupational choice, while others (e.g. Holland, Axelrod) placed greater emphasis on the nature of children’s role playing and career exploration activities as predictors of vocational choice. Despite different theoretical backgrounds, all the theories conceptualized career development as a process beginning in early childhood (Robinson, 2002).

## **1. Strong Interest Inventory (SII)**

The Strong Interest Inventory (SII) is one of the most widely used interest inventories for career counseling (Conoley & Impara, 1994). Formally known as the Strong Campbell Interest Inventory (SCII), the SII is a multiple-choice test designed by E.K. Strong, Jr. Introduced in 1927 as the Strong Vocational Interest Blank (SVIB), it has been revised a number of times, the latest being in 1994.

The SII is based on the idea that individuals are more satisfied and productive when they work in jobs or at tasks that they find interesting and when they work with people whose interests are similar to their own. The respondent's interests are compared to thousands of individuals who report being happy and successful in their jobs and career choices are suggested, accordingly (Harmon et al, 1994).

The SII consists of 325 multiple-choice questions relating to the test-taker's interest in occupations, activities, and types of people. Respondents are scored on four different sets of scales: General Occupation Themes, Basic Interest, Personal Style, and Occupation. These scales are presented to the respondent as a profile – providing information regarding their orientation to work, areas, occupation, learning and working styles and areas of special attention. The test taker may then use these results to assist them in making educational and career decisions.

The first of the four sets of scales is the General Occupation Themes (GOT). Based largely on the work of John Holland, they were added to the SII in 1974 (Donnay, 1997). Holland categorizes people into six types. Because a single type cannot accurately categorize most people, secondary and tertiary types are recognized to complete the assessment of the individual. Table 3 provides a description of each of the six General Occupation Themes.

Table 3. General Occupational Themes Descriptions and Sample Jobs

Scale	Description	Sample Jobs
Realistic	Prefer action, like concrete ideas	Police officers, plumbers, mechanics
Investigative	Self-reliant, like to work with ideas	Chemists, physicians
Artistic	Independent, impulsive, and intuitive	Lawyers, musicians, reporters
Social	Friendly, understanding, ethical	Child care providers, teachers
Enterprising	Highly aggressive, social and adventuresome	Realtors, insurance agents
Conventional	Practical, systematic, careful, precise	Accountants, clerical workers

The Basic Interest Scales (BIS) provide more specific interest content and serve as subdivisions of the General Occupational Themes. Table 4 shows the relationship between these Basic Interest Scales and the General Occupation Themes.

Table 4. Basic Interest Scales and Related General Occupation Themes

Basic Interest Scales	General Occupation Themes					
	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
	Agriculture	Science	Music, Drama	Teaching	Public Speaking	Data Management
	Nature	Math	Art	Social Service	Law, Politics	Computer Activities
	Military	Medical Science	Applied Arts	Medical Service	Merchandising	Office Services
	Athletics		Writing	Religious Activities	Sales	
	Mechanical Activities		Culinary Arts		Organizational Management	

The Personal Style Scales are designed to measure the broad preference of living and working styles of different individuals and include four scales: work style, learning environment, leadership style, and risk taking. Table 5 shows the two ends of each scale and lists typical jobs associated with each.

Table 5. Personal Style Scales and Sample Jobs

Scale	Preference	Sample Jobs
Work Style	Working with people	Childcare providers, flight attendants, social workers
	Working with ideas	Chemists, mathematicians, physicists
Learning Environment	Academic environments	Lawyers, physicists
	Practical learning environments	Plumbers, farmers
Leadership Style	Directing others	Elected officials, public administrators
	Leading by example	Chemists, mathematicians
Risk Taking/Adventure	High risk	Emergency medical technicians, police officers
	Low risk	Librarians, mathematicians

The last of the SII scales are the Occupational Scales. There are 211 Occupational scales (separate scales for males and females) and 7 single gender scales. Each scale represents satisfied workers employed in that specific occupation.

The SII has been validated numerous times and has been judged a good predictor of occupational choice (Harmon et al, 1994). Donnay and Borgen (1996) provide a validation of the most recent SII. They studied the 1994 SII's ability to predict occupational group membership and showed that all 35 of the non-occupational scales significantly distinguished among members of various occupations. The Basic Interest Scales (BIS) were shown to be the most valid predictors of group membership.

Despite its success, several criticisms of the SII have been noted. According to Conoley and Impara (1996), published response rates are lacking. This has lead to speculation that each occupation may not be adequately represented and concern over the adequacy of the norms.

Another criticism of the SII, and one that may affect the Naval Academy's use of the SII, has been the non-standardized conditions for administration of the tests. Tests are administered in a wide variety of places – some in a controlled environment and others (as in the case of the Naval Academy) administer the test to themselves at home. The concern is that some individuals may have received information about typical responses that may have affected the scoring of the test (Conoley & Impara, 1996).

Overall, common agreement is that the SII is the best available interest inventory (Conoley & Impara, 1996). It has been judged as a valid, structurally sound, and comprehensive measure of career satisfaction.

## **2. The United States Naval Academy's SII scores**

The United States Naval Academy has a strong desire to graduate midshipmen with technical majors. The institution has sought various methods of identifying applicants who have strong technical interests. Starting in 1967, the Naval Academy looked at using the SII (then known as the Strong Vocational Interest Blank) to help it predict attrition during the first year. At the time, the test was judged to be unproductive and invasive (McNitt, 1982).

The SII emerged again in 1975 when the Navy decided that the Naval Academy should require 80% of midshipmen to select technical majors. With this new requirement, the Navy Personnel Research and Development Center (NPRDC) was asked to develop scoring keys for the SVIB that would predict major, military performance, voluntary resignation and total four year attrition. The test was given to the classes of 1975 through 1978 (McNitt, 1982). By comparing the test results with major selection and retention of these classes, NPRDC was able to create a Candidate Multiple that included SAT scores, rank in class, teacher recommendations, athletic and non-athletic extra-curricular activities and two derivatives of the SVIB: Engineering Science (ESR) and Disenrollment (DISR). The Academic Board approved the use of this candidate multiple in 1975 for use in the admissions for the class of 1980 (McNitt, 1982).

The SVIB derivatives were new scales created by NPRDC using previous Academy classes as the norm. Unadapted SII results were analyzed to select questions most predictive of major selection and career retention. As a result, applicants take the

entire SII but the test is scored based only on the answers to a few selected questions. ESR was validated at between 0.30 and 0.40 for predicting major (technical vs. non-technical). DISR was adopted despite its poor validity coefficient in predicting disenrollment (0.09) because it was deemed better than no predictor (McNitt, 1982). In 1980, the ESR and DISR comprised 23% of the candidate multiple score (9% and 14%, respectively). Various Naval Academy Superintendents have changed the respective weights of the SII measures in the candidate multiple to reflect the current values of the administration. For the class of 2005 admissions process, the two scores comprised only 15% of the multiple (12% and 3%, respectively).

The scales from the SII were renamed “Engineering and Science (E/S)” and “Career Retention (CR)” in the late 1980s and are currently known as “Technical Interest (TIS)” and “Career Interest (CIS)”. Technical Interest and Career Interest scores range between 1 and 1000 with a mean of approximately 500.

As noted earlier, the SII is a valid measure for predicting occupational choice. The Naval Academy’s use of its own scoring system has also shown merit in distinguishing between technical and non-technical majors. NPRDC validated each of the components of the Candidate Multiple numerous times and found that the TIS had a validity coefficient of between 0.40 and 0.44 (Beardon, 1999). Unfortunately, the CIS score has not yet been validated since the applicants are just now reaching 20 years of service.

In his 2001 thesis, Tom Sheppard examined the use of the SII in the admissions process of the United States Naval Academy. His results supported the predictive validity of the SII relative to major selection, but did not support its validity as a predictor of performance. Its inverse or neutral relationship to performance, though, supports the construct validity of the SII as an interest measure vice an academic or cognitive screening tool. The career interest scale (CIS) was not shown to be significant in any of the three performance prediction regressions and was the smallest positive predictor of technical major selection for the overall midshipman sample and the sub sample of women (Sheppard, 2001).

### **3. Other Career Interest Inventories**

Many other career interest instruments are interpretable with the Holland code and are explicitly organized around the six Holland dimensions (Campbell & Borgen, 1999). The Vocational Preference Inventory was developed by John Holland as an assessment of his six-dimensional model of vocational personality characteristics. It comprises 160 occupational titles to which the user responds “like” or “dislike”. Scores are reported for each of the six personality types in the RIASEC model of vocational personality (Robinson, 2002).

The Jackson Vocational Interest Survey (JVIS) consists of 289 pairs of statements describing job related activities and requires approximately 45 minutes to complete. Scoring yields a sex-fair profile along 34 basic interest scales. These scales encompass work role dimensions relevant to a variety of occupations and work style scales indicative of work environment preferences. The JVIS employs a forced-choice format, asking the respondent to indicate a preference between two equally popular interests. The JVIS manual provides thorough documentation on the reliability of the test. For example, the reliability of the 10 general occupational themes ranged from 0.82 to 0.92 with a median of 0.89. Median test-retest stability of the 34 basic interest scales was 0.84 to 0.88 with different samples (Jackson, 1999).

The Career Attitudes and Strategies Inventory (CASI) is an inventory for understanding adult careers. Counselors describe the CASI as a career checkup that surveys beliefs, events, and forces affecting an individual's career as well as a way to identify influences or problems requiring further discussion and explanation. In individual or group settings, the instrument helps to identify and clarify career problems and stimulates constructive discussion of these areas. Potential uses include a general assessment of a company's work environment, sources of worker dissatisfaction, degree of interpersonal abuse, and so forth. The CASI provides a comprehensive inventory of a person's current work situation that includes common attitudes and beliefs as well as strategies for coping with job, family, coworkers, and supervisors. This inventory assesses the likelihood of job stability and helps to clarify situations the individual may perceive as career obstacles (Gottfredson, 2002).

The Kuder General Interest Survey (1970) is a revised form of the Kuder Preference Record-Vocational and measures ten interest areas: outdoor, mechanical, computational, scientific, persuasive, artistic, literary, musical, social service, and clerical (Furnham, 1992).

In summary, interest measures and modern measures of normal personality share a common purpose of trying to forecast occupational success. Vocational interest measures show how much a person will like an occupation; personality measures show the social skills and drives necessary to succeed once in an occupation (Hogan & Blake, 1999).

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### **III. DATA SET AND METHODOLOGY**

#### **A. DATA SET DESCRIPTION**

The data set used in this study was compiled using information provided by the Institutional Research Center at the United States Naval Academy. Specifically, information on graduating students from the classes of 1998-2001 was used.

Because one of the primary missions of the Naval Academy is to produce line officers, only the four major warfare communities – surface warfare, submarine warfare, aviation, and Marine Corps – were analyzed, although two other service assignment groups can be identified. The first is a combination of the highly specialized and limited assignments of special warfare, special operations, and medicine. Approximately 4.3% of graduating midshipmen from the classes of 1998-2001 were assigned to these fields. The second assignment group is a combination of the service assignment options available to midshipmen who are not physically qualified (NPQ) to become a line officer. This is a combination of General Unrestricted Line, Oceanography, Supply, Civil Engineering Corps, Intelligence, Cryptology, and Aviation Maintenance Duty Officer. Approximately 3.5% of graduating midshipmen from the classes of 1998-2001 were assigned to one of these fields. Because these latter two groups have relatively few midshipmen, they were excluded from this study. Table 6 below is a summary of the service assignment options and the categories they were assigned to for this study.

A handful of students (0.2%) in every graduating class elect to transfer to either the Army or the Air Force and were therefore excluded from this study. Likewise, the foreign students (0.6%), midshipmen who were not physically qualified to serve in the Navy at all (0.2%), midshipmen in specialized communities (4.3%) and restricted line communities (3.5%) were also excluded. From the remaining cases, those students that did not have results recorded for the Myers-Briggs Type Indicator (106 cases) or the Strong Interest Inventory (1 case) were also removed. Of the 3498 remaining cases, 251 students did not receive their first choice of service assignment. Since the purpose of this study was to analyze personality and interest measures in relation to preferred job

assignments, these 251 cases were also not included, leaving a final data set of 3004 cases.

Table 6. Service Assignment Options

Service Assignment Options	General Category
Surface Warfare (SWO)	Surface
Surface Warfare (Nuclear)	Surface
Naval Pilot	Aviation
Naval Flight Officer (NFO)	Aviation
Submarine Warfare	Submarine
USMC Pilot	USMC
USMC NFO	USMC
USMC Ground	USMC

Distribution of the final data set sample among the warfare communities is shown in Figure 1.

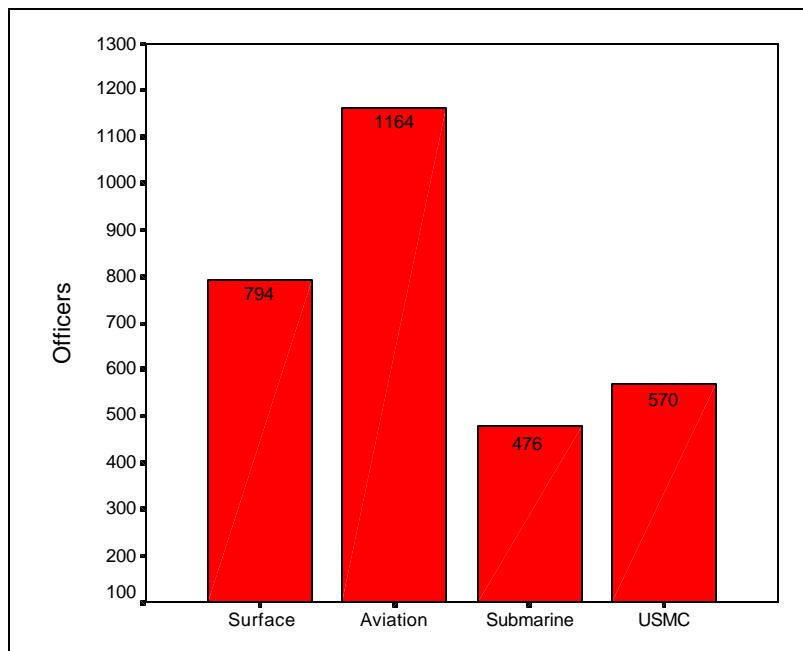


Figure 1. Distribution of Service Assignments

## B. METHODOLOGY

Discriminant analysis is useful in building a predictive model of group membership based on observed characteristics from each case. The procedure generates a discriminant function (or, for more than two groups, a set of discriminant functions) based on linear combinations of the predictor variables that provide the best discrimination between the groups. The functions are generated from a sample of cases for which group membership is known. These functions can then be applied to new cases with measurements for the predictor variables but unknown group membership. For this analysis, group membership in service communities was analyzed. The other variables described below were used as predictors.

The program, Statistical Package for the Social Sciences, commonly known as SPSS, was used for the discriminant analysis. The Rao's V method, where the variable that maximizes Rao's V at each step is entered into the function, was used. The "Probability of F" entry value was set at 0.10 and the removal value was set at 0.15. For classification, the prior possibilities of group membership were assumed to be equal. Using the variables in the following section, analysis were run to predict group membership in the four service selection categories described above. In each analyses, "Group 1", "Class 98", "ESTJ", and "SJ" were used as reference variables.

Six different analyses were done. In all cases, the SII measures (technical and career interest) were used as predictor variables. The analyses differed only in the use of gender and MBTI results as predictor variables. In the first analysis, both genders were included and the MBTI result as a whole was used. In the second analysis, only males were included and the MBTI result as a whole was used. In the third analysis, only females were included and the MBTI result as a whole was used.

Temperaments are a combination of the Sensing-Intuitive (S/N) variable, the Thinking-Feeling (T/F) variable and the Judging-Perceiving (J/P) variable. In order to test the predictive value of the temperament model, an analysis was run using the temperaments as predictor variables. The Extravert-Introvert measure from the MBTI is not used in the temperament model so the E/I variable was also included as a predictor variable. Therefore, in the fourth analysis, both genders were included and the

Temperament and E/I variables were used. In the fifth analysis, only males were included and the Temperament and E/I variables were used. And finally, in the sixth analysis, only females were included and the Temperament and E/I variables were used.

Along with the four-letter identifier commonly identified with the Myers-Briggs results, a numerical score on each of the four MBTI scales is reported. These numerical scores for the classes of 1998-2001 were converted into four scales (E/I, S/N, T/F, and J/P). Three other analyses were done to see if the MBTI numerical scores were better predictors than the dichotomous letter scores. Very little difference was noted. See Appendix A for a graphical representation of the distribution of MBTI scores among the Brigade of Midshipmen.

## C. VARIABLES

The grouping variable used in this analysis was ASSIGN. This variable has six possible values, one for each of the six communities described above.

The predictor variables are made up of a variety of demographic and USNA admissions data as well as individual midshipmen performance data. Results from the Myers-Briggs Type Indicator and the Naval Academy's modified Strong Interest Inventory measures are also included.

**GENDER** – This variable was created to separate males from females. Males, who represent 84.4% of the sample, are coded 1. Females, who represent 15.6% of the sample, are coded 0.

**MINORITY** – This variable was created to indicate minority status. The majority of midshipmen in the data set are Caucasian and are coded as 0. All individuals who did not fall into the majority group were combined into a single minority group. This group represented 17.9% of the data and is coded as 1.

**MILITARY PARENT** – This variable was created to separate those midshipmen who have one or more military parents from those that do not have military parents. Those midshipmen who reported having a parent who had served in the military are coded as 1. All other midshipmen are coded as 0.

**SATM** – This variable is the highest score achieved on the math section of the Scholastic Aptitude Test reported during the Naval Academy admissions process. A higher score indicates higher mathematical ability.

**SATV** – This variable is the highest score achieved on the verbal section of the Scholastic Aptitude Test reported during the Naval Academy admissions process. A higher score indicates higher verbal ability.

**OOMDECIL** – This variable represents the Overall Order of Merit decile that each midshipman falls into at the end of his or her fall semester, senior year. The top 10% of the class is coded as 1, the second 10% as 2, and so on. The bottom 10% of the class is coded as 10.

**CLASS98** – This variable represents members of the graduating class of 1998. Members are coded as 1, all others as 0.

**CLASS99** – This variable represents members of the graduating class of 1999. Members are coded as 1, all others as 0.

**CLASS00** – This variable represents members of the graduating class of 2000. Members are coded as 1, all others as 0.

**CLASS01** – This variable represents members of the graduating class of 2001. Members are coded as 1, all others as 0.

**GROUP1** – The variable represents Group 1 (Engineering) majors. All midshipmen with a group 1 major are coded as 1, all others as 0

**GROUP2** – The variable represents Group 2 (Math/Science) majors. All midshipmen with a group 2 major are coded as 1, all others as 0.

**GROUP3** – The variable represents Group 3 (Humanities/Social Science) majors. All midshipmen with a group 3 major are coded as 1, all others as 0.

**ISTJ** – Midshipmen with MBTI results of ISTJ are coded as 1, all others as 0.

**ISFJ** – Midshipmen with MBTI results of ISFJ are coded as 1, all others as 0.

**INFJ** – Midshipmen with MBTI results of INFJ are coded as 1, all others as 0.

**INTJ** – Midshipmen with MBTI results of INTJ are coded as 1, all others as 0.

**ISTP** – Midshipmen with MBTI results of ISTP are coded as 1, all others as 0.

**ISFP** – Midshipmen with MBTI results of ISFP are coded as 1, all others as 0.

**INFP** – Midshipmen with MBTI results of INFP are coded as 1, all others as 0.

**INTP** – Midshipmen with MBTI results of INTP are coded as 1, all others as 0.

**ESTP** – Midshipmen with MBTI results of ESTP are coded as 1, all others as 0.

**ESFP** – Midshipmen with MBTI results of ESFP are coded as 1, all others as 0.

**ENFP** – Midshipmen with MBTI results of ENFP are coded as 1, all others as 0.

**ENTP** – Midshipmen with MBTI results of ENTP are coded as 1, all others as 0.

**ESTJ** – Midshipmen with MBTI results of ESTJ are coded as 1, all others as 0.

**ESFJ** – Midshipmen with MBTI results of ESFJ are coded as 1, all others as 0.

**ENFJ** – Midshipmen with MBTI results of ENFJ are coded as 1, all others as 0.

**ENTJ** – Midshipmen with MBTI results of ENTJ are coded as 1, all others as 0.

**SP** – Midshipmen with temperaments of SP are coded as 1, all others as 0.

**NF** – Midshipmen with temperaments of NF are coded as 1, all others as 0.

**SJ** – Midshipmen with temperaments of SJ are coded as 1, all others as 0.

**NT** – Midshipmen with temperaments of NT are coded as 1, all others as 0.

**E** – This variable represents the individual's introverted/extraverted standing as determined by his or her MBTI results. Introverts are coded as 0, and Extraverts are coded as 1.

**CISSTD** – This variable is the score from the Naval Academy's measurement of career interest (using the Strong Interest Inventory). Scores range from 135 to 794 with a mean of 498 and a standard deviation of 98.0.

**TISSTD** - This variable is the score from the Naval Academy's measurement of technical interest (using the Strong Interest Inventory). Scores range from 204 to 755 with a mean of 495 and a standard deviation of 94.0.

Table 7 is a summary of the predictor variables used in this analysis.

Table 7. Predictor Variable Description

<b>Variable</b>	<b>Description</b>
Gender	0 = Female; 1 = Male
Minority	0 = Non-minority; 1 = Minority
Military Parent	0 = Parents not in military; 1 = One or more parent in military
Satm	Highest math score achieved on Scholastic Aptitude Test (SAT)
Satv	Highest verbal score achieved on Scholastic Aptitude Test (SAT)
Oomdecil	Overall Order or Merit decile; 1 = Top 10%; 2 = Second 10%; 3 = Third 10 %, 4 = Fourth 10 %; 5 = Fifth 10%; 6 = Sixth 10%; 7 = Seventh 10%; 8 = Eighth 10%; 9 = Ninth 10%; 10 = Bottom 10%
<b>Class98</b>	Graduating class; 0 = Not class of 1998; 1 = Class of 1998
Class99	Graduating class; 0 = Not class of 1999; 1 = Class of 1999
Class00	Graduating class; 0 = Not class of 2000; 1 = Class of 2000
Class01	Graduating class; 0 = Not class of 2001; 1 = Class of 2001
<b>Group1</b>	Academic major; 0 = Not Group 1; 1 = Group 1 (Engineering) major
Group2	Academic major; 0 = Not Group 2; 1 = Group 2 (Math/Science) major
Group3	Academic major; 0 = Not Group 3; 1 = Group 3 (Humanities/SS) major
ISTJ	MBTI result; 0 = Not ISTJ; 1 = ISTJ
ISFJ	MBTI result; 0 = Not ISFJ; 1 = ISFJ
INFJ	MBTI result; 0 = Not INFJ; 1 = INFJ
INTJ	MBTI result; 0 = Not INTJ; 1 = INTJ
ISTP	MBTI result; 0 = Not ISTP; 1 = ISTP
ISFP	MBTI result; 0 = Not ISFP; 1 = ISFP
INFP	MBTI result; 0 = Not INFP; 1 = INFP
INTP	MBTI result; 0 = Not INTP; 1 = INTP
ESTP	MBTI result; 0 = Not ESTP; 1 = ESTP
ESFP	MBTI result; 0 = Not ESFP; 1 = ESFP
ENFP	MBTI result; 0 = Not ENFP; 1 = ENFP
ENTP	MBTI result; 0 = Not ENTP; 1 = ENTP
<b>ESTJ</b>	MBTI result; 0 = Not ESTJ; 1 = ESTJ
ESFJ	MBTI result; 0 = Not ESFJ; 1 = ESFJ
ENFJ	MBTI result; 0 = Not ENFJ; 1 = ENFJ
ENTJ	MBTI result; 0 = Not ENTJ; 1 = ENTJ
SP	Temperament; 0 = Not SP; 1 = SP
NF	Temperament; 0 = Not NF; 1 = NF
<b>SJ</b>	Temperament; 0 = Not SJ; 1 = SJ
NT	Temperament; 0 = Not NT; 1 = NT
E	MBTI result; 0 = Introvert; 1 = Extravert
Cisstd	USNA's SII measure of career interest score
Tisstd	USNA's SII measure of technical interest score

Variables that are highlighted in **bold** are used as reference variables.

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## IV. DATA ANALYSIS

### A. INTRODUCTION

This chapter contains the discriminant analysis models described in the previous chapter. Using SPSS, six different analyses were done. Each analysis differed only in gender of the cases used and the MBTI variables used. As indicated in Chapter III, only the data for individuals receiving their first choice of service assignment were analyzed.

### B. ANALYSIS RESULTS

Table 8 and 9 show the Service Assignment choices of the classes of 1998-2001. As Table 8 indicates, naval aviation is the most popular choice for males, and surface warfare is the most popular choice for females. As Table 9 shows, surface warfare is also the most popular choice for minority midshipmen. Overall, aviation selectees outnumber all other communities.

Table 8. Service Assignment by Gender

Service Assignment	Male		Female		Total	
	Count	%	Count	%	Count	%
USN Surface	536	21.1	258	55.4	794	26.4
USN Aviation	1034	40.7	130	27.9	1164	38.7
USN Submarines	476	18.8	a.	a.	476	15.8
US Marine Corps	492	19.4	78	16.7	570	19.0
Total	2538	100	466	100	3004	100

a. Females are not currently assigned to Submarine Warfare.

Table 9. Service Assignment by Ethnicity

Service Assignment	Minority		Caucasian		Total	
	Count	%	Count	%	Count	%
USN Surface	200	37.5	594	24.0	794	26.4
USN Aviation	142	16.6	1022	41.4	1164	38.7
USN Submarines	81	15.2	395	16.0	476	15.8
US Marine Corps	110	20.6	460	18.6	570	19.0
Total	533	100	2471	100	3004	100

Tables 10 and 11 show the results of the Myers-Briggs Type Indicator test for the classes of 1998-2001. Analysis of this data set shows that 21.8% of graduating midshipmen are of type ESTJ and 20.8% are ISTJ. This is consistent with the literature reviewed in Chapter II. As Table 10 indicates, the results are fairly consistent among the Brigade of Midshipmen regardless of gender or ethnicity.

Table 10. MBTI Results by Gender and Minority

	Males		Females		Caucasian		Minority		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%
<b>ENFJ</b>	53	2.1	19	4.1	49	2.0	23	4.3	72	2.4
<b>ENFP</b>	98	3.9	24	5.2	94	3.8	28	5.3	122	4.1
<b>ENTJ</b>	258	10.2	59	12.7	260	10.5	57	10.7	317	10.6
<b>ENTP</b>	175	6.9	35	7.5	176	7.1	34	6.4	210	7.0
<b>ESFJ</b>	61	2.4	28	6.0	74	3.0	15	2.8	89	3.0
<b>ESFP</b>	38	1.5	14	3.0	43	1.7	9	1.7	52	1.7
<b>ESTJ</b>	548	21.6	106	22.7	549	22.2	105	19.7	654	21.8
<b>ESTP</b>	110	4.3	15	3.2	106	4.3	19	3.6	125	4.2
<b>INFJ</b>	47	1.9	13	2.8	47	1.9	13	2.4	60	2.0
<b>INFP</b>	55	2.2	7	1.5	47	1.9	15	2.8	62	2.1
<b>INTJ</b>	177	7.0	25	5.4	173	7.0	29	5.4	202	6.7
<b>INTP</b>	139	5.5	15	3.2	119	4.8	35	6.6	154	5.1
<b>ISFJ</b>	54	2.1	23	4.9	57	2.3	20	3.8	77	2.6
<b>ISFP</b>	34	1.3	5	1.1	29	1.2	10	1.9	39	1.3
<b>ISTJ</b>	555	21.9	71	15.2	531	21.5	95	17.8	626	20.8
<b>ISTP</b>	136	5.4	7	1.5	117	4.7	26	4.9	143	4.8
<b>Total</b>	2538	100.0	466	100.0	2471	100.0	533	100.0	3004	100.0

Table 11 is a summary of the Temperament results for the class of 1998-2001. Again, the results are fairly consistent with regard to gender and ethnicity. As the table shows, “SJ’s” make up nearly 50% of the Brigade of Midshipmen.

Table 11. Temperament Results by Gender and Minority

	Males		Females		Caucasian		Minority		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%
<b>SP</b>	318	12.5	41	8.8	295	11.9	64	12.0	359	12.0
<b>NF</b>	253	10.0	63	13.5	237	9.6	79	14.8	316	10.5
<b>SJ</b>	1218	48.0	228	48.9	1211	49.0	235	44.1	1446	48.1
<b>NT</b>	749	29.5	134	28.8	728	29.5	155	29.1	883	29.4
<b>Total</b>	2538	100.0	466	100.0	2471	100.0	533	100.0	3004	100.0

Figure 2 is a graphical display of the MBTI results for each service community assignment. It is interesting to note that while the surface warfare, naval aviation and Marine Corps community selectees are more extraverted (approximately 55% of the data set), 56% of the submarine community selectees are introverted.

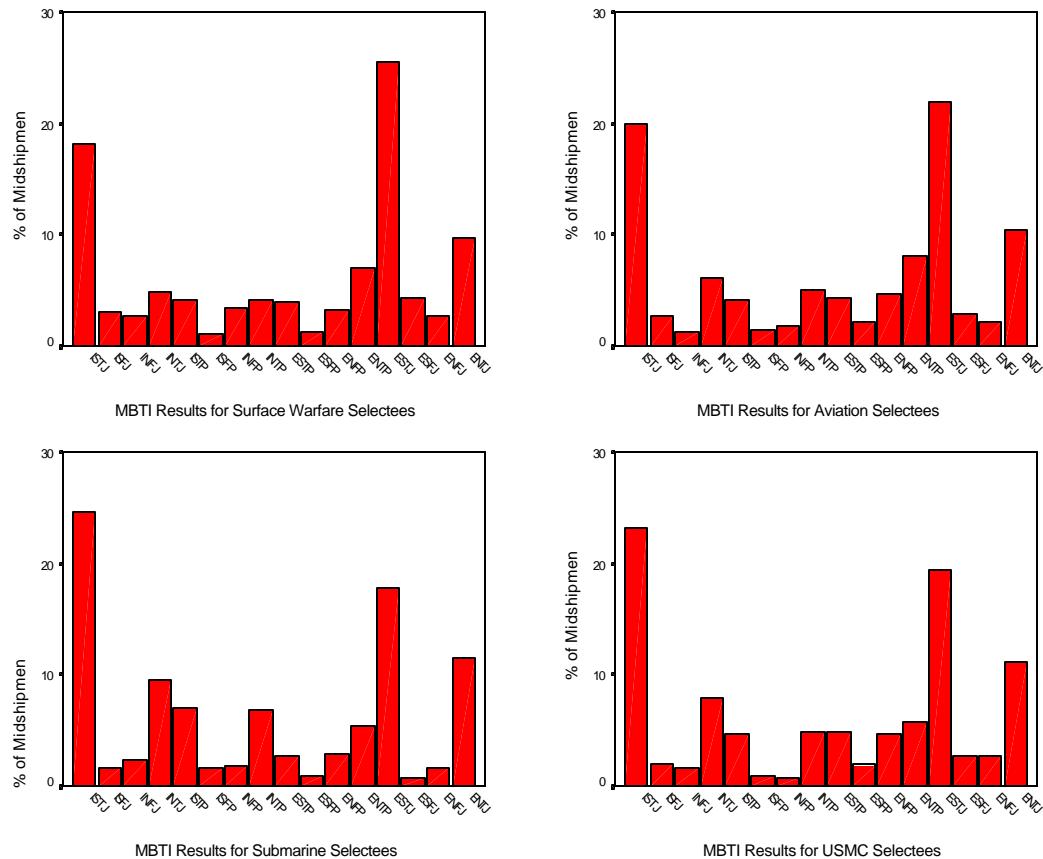


Figure 2. MBTI Results For Each Major Service Assignment Community

In discriminant function analysis with more than two groups, a number of discriminant functions are extracted. It is frequently the case that the first one or two discriminant functions account for the lion's share of discriminating power, with no additional information forthcoming from the remaining functions. Groups are spaced along the various discriminant functions according to their centroids. If there is a big difference between the centroid of one group and the centroid of another along a discriminant function axis, the discriminant function separates the two groups. Tables 12 through 23 below provide the summary statistics and structure coefficients from the six different discriminant analyses of the U.S. Naval Academy classes of 1998-2001.

### **1. Analysis of Both Genders Using MBTI results as a Variable**

The first discriminant analysis that was run analyzed the entire data set and included the sixteen possible MBTI results as variables. Three discriminant functions were calculated, with a combined  $\chi^2$  (33) of 737.715,  $p < 0.01$ . The three discriminant functions accounted for 85.4%, 10.8%, and 3.8%, respectively, of the between-group variability. As the group centroids in Table 12 show, the first function maximally separates USN Surface from USN Submarines selectees. The second discriminant function separates USN Surface selectees and USN Submarine selectees from the remaining two groups, and the third function separates USN Aviation from USMC selectees.

Table 12. Summary Statistics for Discriminant Analysis of Service Assignment – Both Genders With MBTI Results Used As Variables

<b>Group Centroids</b>	<b>Function 1</b>	<b>Function 2</b>	<b>Function 3</b>	<b>Percent Correct Classification</b>
USN Surface	.674	-.149	.021	51.5
USN Aviation	-.156	.141	.090	22.7
USN Subs	-.795	-.269	-.026	65.1
USMC	.044	.145	-.191	33.0
Eigenvalue	.231	.029	.010	Overall: 39.0
Relative Percentage	85.4	10.8	3.8	
Canonical Correlation	.433	.101	.101	
Wilks' Lambda	.782	.962	.990	
df	33	20	9	
Chi-square ( $\chi^2$ )	737.715	116.311	30.653	
Significance	.000	.000	.000	

Table 13 suggests that the best predictors for distinguishing between the service assignment groups are gender, OOM decile, and Math SAT in the first function; Group 3 major, Class of '01, ENFP, ESFP, and Group 2 major in the second function; and minority, INFP, and military parent in the third function.

Table 13. Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Both Genders With MBTI Results Used As Variables

Variable	Function		
	1	2	3
<b>Gender</b>	-.658(*)	0.296	-0.206
<b>OOM decile</b>	.549(*)	0.086	0.171
<b>Math SAT</b>	-.453(*)	-0.283	0.438
Technical Interest Score(a)	-.240(*)	-0.142	0.138
Career Interest Score(a)	-.155(*)	-0.064	0.058
ISTJ(a)	-.080(*)	-0.019	-0.016
INTJ(a)	-.058(*)	-0.038	0.021
ISFJ(a)	.055(*)	-0.026	-0.026
ESFJ(a)	.047(*)	-0.009	-0.024
ENTP(a)	.037(*)	0.003	0.017
<b>Group 3 major</b>	0.401	.495(*)	-0.361
<b>Class of 01</b>	-0.033	-.298(*)	-0.118
<b>ENFP</b>	-0.007	.233(*)	-0.004
<b>ESFP</b>	0.000	.187(*)	0.062
<b>Group 2 major</b>	0.073	-.151(*)	-0.062
Class of 00(a)	0.036	.113(*)	0.069
Class of 99(a)	0.005	.108(*)	0.027
INTP(a)	-0.023	-.043(*)	0.013
ENTJ(a)	0.017	-.041(*)	-0.015
ESTP(a)	0.016	.028(*)	-0.007
ISFP(a)	0.007	-.020(*)	0.000
<b>Minority</b>	0.203	-0.476	-.529(*)
<b>INFP</b>	0.088	-0.248	.336(*)
<b>Military Parent</b>	-0.033	0.297	.315(*)
Verbal SAT(a)	-0.179	-0.045	.202(*)
ENFJ(a)	0.040	-0.032	-.061(*)
ISTP(a)	-0.009	0.010	-.024(*)
INFJ(a)	0.012	-0.015	-.017(*)
Variables ordered by absolute size of correlation within function.			
* Largest absolute correlation between each variable and any discriminant function			
a This variable not used in the analysis.			

Because males and females at the U.S. Naval Academy do not have the same choices for service assignment (females are not permitted to select Submarine Warfare), it was decided to analyze the data by separating the male and female cases. The next two analyses look at the differences in predictor variables for each gender.

## **2. Analysis of Males Using MBTI Results as a Variable**

The second discriminant analysis that was run analyzed only the males in the data set and included the sixteen possible MBTI results as variables. Three discriminant functions were calculated, with a combined  $\chi^2$  (24) of 428.178,  $p < 0.01$ . The three discriminant functions accounted for 82.0%, 12.8%, and 5.2%, respectively, of the between-group variability. As the group centroids in Table 14 show, the first function maximally separates USN Surface and USN Submarines from each other. The second discriminant function separates USN Surface and USN Submarines from the other two groups, and the third function separates USMC from the other three groups.

Table 15 suggests that the best predictors for distinguishing between the service assignment groups for male midshipmen are OOM decile, Math SAT, and Group 3 major in the first function; Minority, Military Parent, Class of '01 and Group 2 major in the second function; and INFP in the third function.

Table 14. Summary Statistics for Discriminant Analysis of Service Assignment – Males Only With MBTI Results Used As Variables

<b>Group Centroids</b>	<b>Function 1</b>	<b>Function 2</b>	<b>Function 3</b>	<b>Percent Correct Classification</b>
USN Surface	.539	.191	.040	54.1
USN Aviation	-.059	-.134	.077	18.4
USN Subs	-.648	.179	-.026	61.8
USMC	.164	-.099	-.181	11.1
Eigenvalue	.147	.023	.009	Overall: 35.4
Relative Percentage	82.0	12.8	5.2	
Canonical Correlation	.358	.150	.096	
Wilks' Lambda	.844	.969	.991	
df	24	14	6	
Chi-square ( $\chi^2$ )	428.178	80.740	23.314	
Significance	.000	.000	.001	

Table 15. Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Males Only With MBTI Results Used As Variables

Variable	Function		
	1	2	3
<b>OOM decile</b>	.764(*)	0.270	0.315
<b>Math SAT</b>	-.588(*)	0.098	0.443
<b>Group 3 major</b>	.568(*)	-0.309	-0.261
Verbal SAT(a)	-.287(*)	-0.105	0.184
Technical Interest Score(a)	-.194(*)	0.132	0.140
Career Interest Score(a)	-.161(*)	0.014	0.035
INTJ(a)	-.071(*)	-0.011	0.009
ISTJ(a)	-.068(*)	-0.037	-0.022
ESFP(a)	.068(*)	-0.011	0.008
ENFP(a)	.057(*)	-0.004	-0.030
ESTP(a)	.044(*)	-0.037	-0.002
ISTP(a)	.025(*)	0.017	0.001
INFJ(a)	-.022(*)	-0.016	-0.010
<b>Minority</b>	0.198	.593(*)	-0.526
<b>Military Parent</b>	-0.059	-.519(*)	0.167
<b>Class of 01</b>	-0.092	.344(*)	0.014
<b>Group 2 major</b>	0.035	.165(*)	0.001
Class of 00(a)	0.056	-.125(*)	0.043
Class of 99(a)	0.029	-.121(*)	-0.014
INTP(a)	-0.010	.026(*)	0.016
ISFP(a)	0.018	.018(*)	-0.002
<b>INFP</b>	0.102	0.323	.430(*)
ENFJ(a)	0.003	0.014	-.077(*)
ISFJ(a)	0.005	0.008	-.049(*)
ENTJ(a)	-0.018	0.005	-.033(*)
ESFJ(a)	0.015	-0.013	-.030(*)
ENTP(a)	0.022	-0.002	.029(*)
Variables ordered by absolute size of correlation within function.			
* Largest absolute correlation between each variable and any discriminant function			
a This variable not used in the analysis.			

### 3. Analysis of Females Using MBTI Results as a Variable

The third discriminant analysis analyzed only the females in the data set and included the sixteen possible MBTI results as variables. Two discriminant functions were calculated, with a combined  $\chi^2$  (10) of 34.533,  $p < 0.01$ . The two discriminant functions accounted for 84.1% and 15.9%, respectively, of the between-group variability. As the group centroids in Table 16 show, the first function maximally separates USN

Surface from USMC and USN Aviation. The second discriminant function separates USN Aviation from the other two groups.

Table 17 suggests that the best predictors for distinguishing between the service assignment groups for female midshipmen are Minority, OOM decile, ENFP, ESFJ, and Military Parent in the first function and military parent in the second function.

Table 16. Summary Statistics for Discriminant Analysis of Service Assignment – Females Only With MBTI Results Used As Variables

<b>Group Centroids</b>	<b>Function 1</b>	<b>Function 2</b>	<b>Percent Correct Classification</b>
USN Surface	.224	-.018	28.3
USN Aviation	-.223	.148	50.8
USMC	-.369	-.186	46.2
Eigenvalue	.065	.012	Overall: 37.6
Relative Percentage	84.1	15.9	
Canonical Correlation	.247	.110	
Wilks' Lambda	.928	.988	
df	10	4	
Chi-square ( $\chi^2$ )	34.533	5.595	
Significance	.000	.231	

Table 17. Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Females Only With MBTI Results Used As Variables

Variable	Function	
	1	2
<b>Minority</b>	.629(*)	-0.623
<b>OOM decile</b>	.444(*)	0.362
<b>ENFP</b>	-.423(*)	-0.094
<b>ESFJ</b>	.400(*)	-0.013
Math SAT(a)	-.268(*)	-0.090
Verbal SAT(a)	-.204(*)	-0.048
INTJ(a)	-.091(*)	-0.031
ESFP(a)	.084(*)	0.054
Class of 00(a)	.084(*)	-0.034
INFJ(a)	.056(*)	-0.028
ISFP(a)	.051(*)	-0.006
Group 3 major(a)	.048(*)	0.010
ENFJ(a)	.044(*)	-0.035
Group 2 major(a)	.039(*)	0.027
Class of 01(a)	.028(*)	0.016
INFP(a)	.009(*)	-0.002
<b>Military Parent</b>	0.316	.478(*)
Career Interest Score(a)	-0.067	.095(*)
ISTP(a)	0.033	.088(*)
ISFJ(a)	0.058	.081(*)
INTP(a)	0.020	-.069(*)
ENTJ(a)	-0.015	.053(*)
Class of 99(a)	-0.033	-.052(*)
ENTP(a)	-0.008	.048(*)
Technical Interest Score(a)	-0.016	.041(*)
ISTJ(a)	-0.008	.026(*)
ESTP(a)	-0.009	.014(*)
Variables ordered by absolute size of correlation within function.		
* Largest absolute correlation between each variable and any discriminant function		
a This variable not used in the analysis.		

The last three analyses removed the sixteen MBTI variables and replaced them with the Temperament and Extravert/Introvert (E/I) variables. It was hoped that reducing the number of personality variables would improve the percent of correct classification. Again, the data was analyzed three times to account for differences among the genders.

#### **4. Analysis of Both Genders Using Temperament and E/I Results as Variables**

The fourth discriminant analysis analyzed both genders in the data set and included the four temperament results and the extraverted/introverted (E/I) result as variables. Three discriminant functions were calculated, with a combined  $\chi^2$  (30) of 728.484,  $p < 0.01$ . The three discriminant functions accounted for 85.9%, 10.2% and 3.9%, respectively, of the between-group variability. As the group centroids in Table 18 show, the first function maximally separates USN Surface and USN Submarines from the other two groups. The second discriminant function separates USN Aviation and USMC from the other two groups, and the third function separates USMC from the other groups.

Table 19 indicates that the best predictors for distinguishing between the service assignment groups for midshipmen are Gender, Order of Merit and “NT” in the first function; Minority, Military Parent, ‘E’, Class of ’01, and Group 2 major in the second function; and Math SAT and Group 3 major in the third function.

Table 18. Summary Statistics for Discriminant Analysis of Service Assignment – Both Genders With Temperament and E/I Results Used As Variables

<b>Group Centroids</b>	<b>Function 1</b>	<b>Function 2</b>	<b>Function 3</b>	<b>Percent Correct Classification</b>
USN Surface	.660	-.142	-.037	50.6
USN Aviation	-.144	.162	-.074	26.1
USN Subs	-.812	-.257	-.003	65.3
USMC	.052	.081	.204	31.4
Eigenvalue	.229	.027	.010	Overall: 39.8
Relative Percentage	85.9	10.2	3.9	
Canonical Correlation	.431	.163	.101	
Wilks' Lambda	.784	.963	.990	
df	30	18	8	
Chi-square ( $\chi^2$ )	728.484	111.479	30.906	
Significance	.000	.000	.000	

Table 19. Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Both Genders With Temperament and E/I Results Used As Variables

Variable	Function		
	1	2	3
<b>Gender</b>	-.658(*)	0.328	0.298
<b>OOM decile</b>	.552(*)	0.063	-0.146
Technical Interest Score(a)	-.243(*)	-0.152	-0.158
Verbal SAT(a)	-.203(*)	-0.018	-0.144
Career Interest Score(a)	-.154(*)	-0.057	-0.088
<b>NT</b>	-.112(*)	0.010	0.090
NF(a)	.091(*)	-0.002	-0.009
SP(a)	.054(*)	0.012	-0.030
<b>Minority</b>	0.199	-.558(*)	0.372
<b>Military Parent</b>	-0.030	.339(*)	-0.218
<b>E</b>	0.157	.330(*)	-0.265
<b>Class of 01</b>	-0.036	-.313(*)	0.025
<b>Group 2 major</b>	0.072	-.165(*)	0.014
Class of 00(a)	0.036	.124(*)	-0.014
Class of 99(a)	0.010	.101(*)	-0.011
<b>Math SAT</b>	-0.457	-0.202	-.511(*)
<b>Group 3 major</b>	0.407	0.431	.501(*)
Variables ordered by absolute size of correlation within function.			
* Largest absolute correlation between each variable and any discriminant function			
a This variable not used in the analysis.			

## 5. Analysis of Males Using Temperament and E/I Results as Variables

The fifth discriminant analysis analyzed only males in the data set and included the four temperament results and the extraverted/introverted (E/I) result as variables. Three discriminant functions were calculated, with a combined  $\chi^2$  (24) of 425.864,  $p < 0.01$ . The three discriminant functions accounted for 82.8%, 12.9% and 4.3%, respectively, of the between-group variability. As the group centroids in Table 20 indicate, the first function maximally separates USN Surface and USN Submarines from the other two groups. The second discriminant function separates Aviation from the other three groups. The third function separates USMC from the other three groups.

Table 20. Summary Statistics for Discriminant Analysis of Service Assignment – Males Only With Temperament and E/I Results Used As Variables

<b>Group Centroids</b>	<b>Function 1</b>	<b>Function 2</b>	<b>Function 3</b>	<b>Percent Correct Classification</b>
USN Surface	.528	.176	.062	53.5
USN Aviation	-.051	-.159	.050	20.1
USN Subs	-.661	.177	.001	60.3
USMC	.171	-.028	-.173	22.2
Eigenvalue	.148	.023	.008	Overall: 35.1
Relative Percentage	82.8	12.9	4.3	
Canonical Correlation	.359	.150	.087	
Wilks' Lambda	.845	.970	.992	
df	24	14	6	
Chi-square ( $\chi^2$ )	425.864	76.829	19.360	
Significance	.000	.000	.004	

Table 21. Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Males Only With Temperament and E/I Results Used As Variables

<b>Variable</b>	<b>Function</b>		
	<b>1</b>	<b>2</b>	<b>3</b>
<b>OOM decile</b>	.759(*)	0.265	0.464
<b>Math SAT</b>	-.588(*)	-0.009	0.498
<b>Group 3 major</b>	.569(*)	-0.225	-0.390
Verbal SAT(a)	-.299(*)	-0.131	0.096
Technical Interest Score(a)	-.207(*)	0.145	0.183
Career Interest Score(a)	-.163(*)	0.024	0.053
SP(a)	.074(*)	0.027	0.022
NF(a)	.045(*)	0.002	-0.037
<b>Minority</b>	0.191	.667(*)	-0.316
<b>Military Parent</b>	-0.054	-.533(*)	-0.033
<b>E</b>	0.177	-.329(*)	0.203
<b>Class of 01</b>	-0.095	.326(*)	0.152
<b>Group 2 major</b>	0.034	.162(*)	0.069
Class of 00(a)	0.052	-.133(*)	-0.037
Class of 99(a)	0.032	-.102(*)	-0.043
NT(a)	-0.029	0.005	.085(*)
Variables ordered by absolute size of correlation within function.			
* Largest absolute correlation between each variable and any discriminant function			
a This variable not used in the analysis.			

Table 21 indicates that the best predictors for distinguishing between the service assignment groups for male midshipmen are Order of Merit, Math SAT, and Group 3 major in the first function; Minority, Military Parent, “E”, Class of ’01 and Group 2 major in the second function.

### **6. Analysis of Females Using Temperament and E/I Results as Variables**

The sixth and final discriminant analysis analyzed only females in the data set and included the four temperament results and the extraverted/introverted (E/I) result as variables. Two discriminant functions were calculated, with a combined  $\chi^2$  (6) of 22.258,  $p < 0.01$ . The two discriminant functions accounted for 75.9% and 24.1%, respectively, of the between-group variability. As the group centroids in Table 22 indicate, the first function maximally separates USN Surface from the other two groups. The second discriminant function separates USN Aviation from the other two groups.

Table 22. Summary Statistics for Discriminant Analysis of Service Assignment – Females Only With Temperament and E/I Results Used As Variables

Group Centroids	Function 1	Function 2	Percent Correct Classification
USN Surface	.172	-.010	23.3
USN Aviation	-.190	.137	54.6
USMC	-.251	-.195	46.2
Eigenvalue	.037	.012	Overall: 35.8
Relative Percentage	75.9	24.1	
Canonical Correlation	.189	.108	
Wilks' Lambda	.953	.988	
df	6	2	
Chi-square ( $\chi^2$ )	22.258	5.409	
Significance	.001	.067	

Table 23 indicates that the best predictors for distinguishing between the service assignment groups for female midshipmen are Minority and Order of Merit in the first function and Military Parent in the second function.

Table 23. Pooled Within Group Structure Coefficients Showing Correlation Between Service Assignment Variables and Discriminant Functions – Females Only With Temperament and E/I Results Used As Variables

Variable	Function	
	1	2
<b>Minority</b>	.857(*)	-0.510
<b>OOM decile</b>	.566(*)	0.454
Math SAT(a)	-.330(*)	-0.138
Verbal SAT(a)	-.238(*)	-0.088
NF(a)	.132(*)	0.009
Career Interest Score(a)	-.099(*)	0.068
Group 3 major(a)	.079(*)	0.034
SP(a)	.078(*)	0.076
Class of 00(a)	.077(*)	-0.029
NT(a)	-.075(*)	-0.008
Group 2 major(a)	.050(*)	0.035
Technical Interest Score(a)	-.036(*)	0.025
E(a)	-.026(*)	-0.005
Class of 01(a)	-.018(*)	0.001
<b>Military Parent</b>	0.394	.547(*)
Class of 99(a)	0.012	-.035(*)
Variables ordered by absolute size of correlation within function.		
* Largest absolute correlation between each variable and any discriminant function		
a This variable not used in the analysis.		

## **V. CONCLUSIONS AND RECOMMENDATIONS**

### **A. INTRODUCTION**

This study focused on assessing the relationship between the Myers-Briggs Type Indicator (MBTI), Strong Interest Inventory (SII) measures of career interest and technical interest, and service community assignment among the Brigade of Midshipmen at the United States Naval Academy. Specifically, the study analyzed the predictive value of personality and interest measures when combined with a variety of demographic data to predict occupational choice. This information may be used to help counsel midshipmen as they decide what future career path to take.

Overall, the four letter Myers-Briggs Type Indicator results and temperaments were mildly good predictors of service assignment, particularly for female midshipmen. Career Interest and Technical Interest scores had very low predictive value. The best predictors were found to be primarily cognitive and demographic variables such as Order of Merit (OOM), gender, minority status, math SAT results, and academic major.

### **B. RESULTS**

#### **1. Combined Gender Analysis Using MBTI Results As Predictors**

The first three analyses used the four-letter MBTI types as part of the predictor variables. Using a combined gender set, gender, Order of Merit, and Math SAT results were the most predictive variables, accounting for 85.4% of the between-group variability. Personality variables were salient only in the second and third function of the model and accounted for only 14.6% of the variability. This model had an overall correct classification rate of 39.0% as compared to a correct “chance” classification rate of 25%.

#### **2. Male Midshipmen Analysis Using MBTI Results as Predictors**

Male and female midshipmen differ in the service assignment choices they are allowed to make, so separate discriminant analysis were run for each gender. Female midshipmen are not currently permitted to choose Submarine Warfare as a community, so they only have three primary options for service assignment. When only male midshipmen were analyzed with MBTI results as predictors, Order of Merit, Math SAT

scores, and Group 3 (Humanities/Social Sciences) major were the primary predictive variables. These variables accounted for 82.0% of the between-group variability. This time, personality measures were not really contributors until the third discriminant function and accounted for only 5.2% of the variability. This model had a 35.4% correct classification rate as compared to “chance” at 25%.

### **3. Female Midshipmen Analysis Using MBTI Results as Predictors**

Using full MBTI results as predictor variables, it was found that some personality factors were fairly good predictive measures of female service assignment. Specifically, minority, Order of Merit, ENFP, and ESFJ accounted for 84.1% of the between-group variability, whereas 15.9% of the variability was accounted for by military parent status. However, this model only correctly classified 37.6% of the midshipmen compared to a 33% “chance” correct classification.

### **4. Combined Gender Analysis Using Temperament and E/I Results As Predictors**

The next three analyses examined the use of temperaments and the E/I variable as predictors. All other predictor variables used in the discriminant analysis remained the same. Using the combined gender set, exchanging temperament and the E/I for the full MBTI predictor altered the discriminant function. Gender and Order of Merit were found to be strong predictors, accounting for 85.9% of the between-group variability. Minority status, military parent status, “E”, Class of 01 and Group 2 (Math/Science) major accounted for 10.2% of the variability, and Math SAT results and Group 3 (Humanities/Social Sciences) major accounted for 3.9%. Compared to “chance” of 25%, 39.8% of the cases were correctly classified.

### **5. Male Midshipmen Analysis Using Temperament and E/I Results as Predictors**

When only male midshipmen service assignments were analyzed using temperaments and the E/I variable it was found that Order of Merit, Math SAT results, and Group 3 major were fairly good predictors and accounted for 82.8% of the variability. Minority status, military parents status, “E”, Class of 01, and Group 2 (Math/Science) major accounted for 12.9% of the variability. Only 35.1% of the cases were classified correctly.

## **6. Female Midshipmen Analysis Using Temperament and E/I Results as Predictors**

The last analysis once again examined only female midshipmen. Minority, Order of Merit, and military parent status were found to be the biggest predictor variables. This model accurately classified 35.8% of the cases compared to a “chance” prediction of 33%.

## **C. CONCLUSIONS**

Although personality factors do appear in several of the discriminant functions, cognitive and demographic data dominate the predictive variables. It was not surprising to find gender among the dominant predictors because of the differences in service assignment. Order of Merit’s predominance was also not surprising given that a large part of the service assignment process is based on Order of Merit. The presence of academic major as a significant predictor in this study validates Arcement’s (1998) finding that there are indeed significant correlations between academic major and service assignment.

It was interesting to find “military parent” as a dominant predictor variable. The data set does not specify what particular service community the parents are a part of, so it is impossible to tell if midshipmen ”follow in their father’s footsteps” by entering the same community.

Four Myers-Briggs Type Indicator results appeared as predictor variables - “ESFJ”, “INFP”, “ESFP”, and “ENFP” showing that there is a relationship between personality factors and service assignment. However, further analysis is recommended to determine why only these four results were found to be significant.

In the final three analyses, both “NT” and “E” appeared as dominant predictor variables. Again, this shows a relationship between personality factors and service community, but further research is needed to determine the exact nature of that relationship.

Despite being used as variables in all six of the analyses, the Strong Interest Inventory measures of career interest and technical interest demonstrated very little or no

relationship to service assignment. This is not surprising given the intended use of the two measures by the Admissions Board.

## **D. RECOMMENDATIONS**

Two types of recommendations are made. The first type deals with Naval Academy policy; the second type provides recommendations for further research.

### **1. Policy**

The Naval Academy needs to begin career counseling long before the first (senior) class year. In-house programs for those students who have shown an interest in one or more communities should be expanded and offered to more underclassmen. Making these programs available to all midshipmen would provide a valuable source of information and allow the midshipmen to explore their desired career field from many perspectives over the course of four years.

Secondly, formal career counseling should strive to match each midshipman with his or her optimum community. By steering midshipmen to the career fields most suited to their personality and interests, the Navy might see an increase in retention among junior officers. This might be accomplished by integrating more personality and career interest training for midshipmen. The Naval Academy should also consider analyzing the complete results of each midshipman's Strong Interest Inventory to see if it might be useful in helping midshipmen make career choices.

### **2. Further Research**

This study has demonstrated that a variety of cognitive and demographic data available on midshipmen may be used to predict service assignment among the Brigade. While personality measures do add to discriminability, various other factors are stronger predictors. The Myers-Briggs Type Indicator is only one of many personality measurement tools available. Another tool might be able to better demonstrate predictive ability, and should be researched.

Instead of using the Naval Academy's adapted Strong Interest Inventory results, it would be interesting to examine whether the raw, unaltered Strong Interest scores would

be better predictors of midshipmen service assignment. As was discussed in Chapter II, the Strong Interest Inventory should be a fairly good predictor.

An analysis of personality career interest indicators and fleet retention of Naval Academy graduates may also provide interesting results. This might further demonstrate the usefulness of the Strong Interest Inventory in predicting occupational happiness.

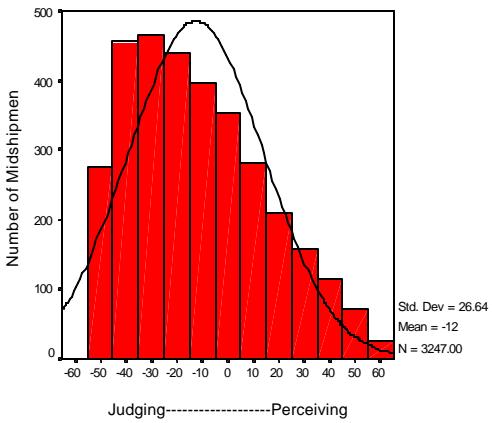
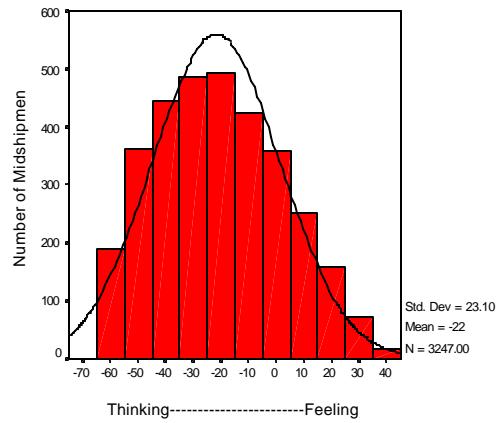
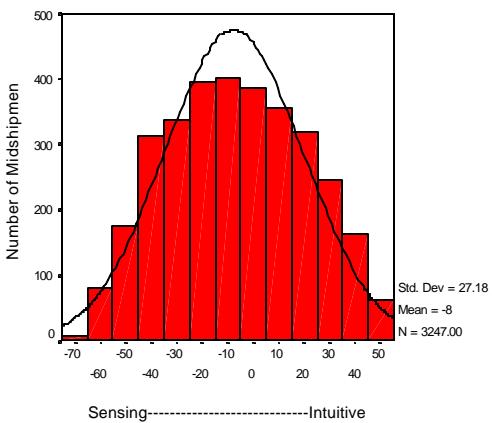
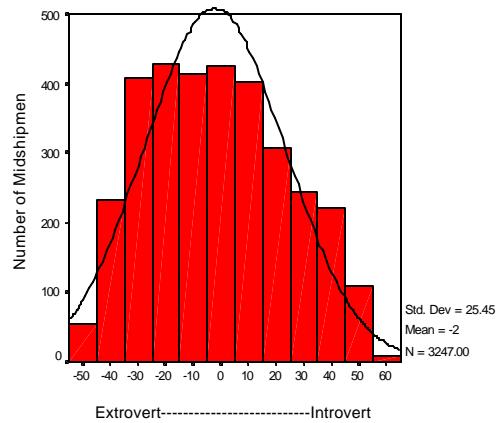
A qualitative study could be conducted to analyze why midshipmen choose the service communities that they do. For example, did they want to do what their parent(s) did? Did they pick Surface Warfare as their first choice because they knew their Order of Merit was likely not good enough to select another community? This examination would likely indicate a variety of variables that might be included in a future discriminant analysis.

Finally, those individuals who did not get their first choice of service assignment should be analyzed. However, this may be difficult due to the relatively small numbers of people not receiving their first choice.

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## APPENDIX A

The following 4 charts represent the Numerical Score Distribution of MBTI results for the classes of 1998-2001.



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